PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : E01F 15/00 | A1

(11) International Publication Number: WO 96/29473

(43) International Publication Date: 26 September 1996 (26.09.96)

(21) International Application Number: PCT/DK96/00110

(22) International Filing Date: 20 March 1996 (20.03.96)

(30) Priority Data:
0277/95 20 March 1995 (20.03.95) DK

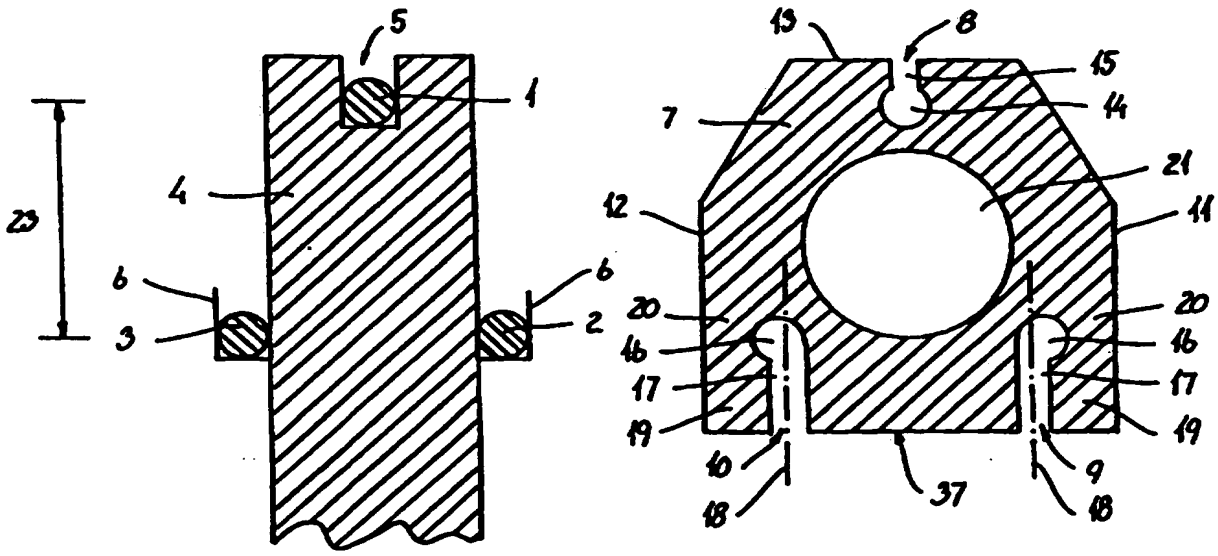
(71)(72) Applicant and Inventor: DAVIDSEN, Gunnar [DK/DK]; Tornum Skovvej 4, DK-6660 Lintrup (DK).

(74) Agent: PATRADE A/S; Store Torv 1, DK-8000 Aarhus C (DK).

(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: A PROFILE UNIT FOR CABLE CRASH BARRIERS



(57) Abstract

A profile unit (7) has a cross section with recesses (8-10) designed to receive cables (1-3) of a cable crash barrier. The recesses (8-10) are located within the outer contour of the profile unit (7) so that the latter appears smooth. At the sides facing a roadway, the profile unit has substantially vertical surfaces (11, 12). The profil unit (7) may have a length to fully or partially cover the distance between two subsequent posts (4) of a cable crash barrier. The profile unit (7) makes it possible to prevent cars from passing under or between the cables (1-3) of a cable crash barrier.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AM	Armenia	**GB**	United Kingdom	**MW**	Malawi
AT	Austria	**GE**	Georgia	**MX**	Mexico
AU	Australia	**GN**	Guinea	**NE**	Niger
BB	Barbados	**GR**	Greece	**NL**	Netherlands
BE	Belgium	**HU**	Hungary	**NO**	Norway
BF	Burkina Faso	**IE**	Ireland	**NZ**	New Zealand
BG	Bulgaria	**IT**	Italy	**PL**	Poland
BJ	Benin	**JP**	Japan	**PT**	Portugal
BR	Brazil	**KE**	Kenya	**RO**	Romania
BY	Belarus	**KG**	Kyrgystan	**RU**	Russian Federation
CA	Canada	**KP**	Democratic People's Republic of Korea	**SD**	Sudan
CF	Central African Republic			**SE**	Sweden
CG	Congo	**KR**	Republic of Korea	**SG**	Singapore
CH	Switzerland	**KZ**	Kazakhstan	**SI**	Slovenia
CI	Côte d'Ivoire	**LI**	Liechtenstein	**SK**	Slovakia
CM	Cameroon	**LK**	Sri Lanka	**SN**	Senegal
CN	China	**LR**	Liberia	**SZ**	Swaziland
CS	Czechoslovakia	**LT**	Lithuania	**TD**	Chad
CZ	Czech Republic	**LU**	Luxembourg	**TG**	Togo
DE	Germany	**LV**	Latvia	**TJ**	Tajikistan
DK	Denmark	**MC**	Monaco	**TT**	Trinidad and Tobago
EE	Estonia	**MD**	Republic of Moldova	**UA**	Ukraine
ES	Spain	**MG**	Madagascar	**UG**	Uganda
FI	Finland	**ML**	Mali	**US**	United States of America
FR	France	**MN**	Mongolia	**UZ**	Uzbekistan
GA	Gabon	**MR**	Mauritania	**VN**	Viet Nam

A PROFILE UNIT FOR CABLE CRASH BARRIERS

The present invention relates to a profile unit for cable crash barriers consisting of cables supported by posts, which are arranged at intervals in the length of the cables and have recesses for receiving the cables, said profile unit comprising recesses for introducing and receiving the cables of the cable crash barrier within the outer contour of the profile unit.

Cable crash barriers are known today that are designed to be placed in the centre strip between two roadways with opposite traffic directions and that consist of cables suspended between posts. This is probably the most common widespread use of cable crash barriers. Cable crash barriers may also be used as crash barriers at roadsides, e.g. as a fencing toward steep slopes.

Other crash barriers are also known for the same use in the centre strip or in the roadside, which comprise a plate mounted on posts and facing the roadways. This plate may be produced from concrete bars or steel bars.

The posts are arranged at a mutual distance prescribed by international standards. Likewise, cables or plates are dimensioned according to international standards in order to resist the shocks of crashes.

In recent years there has been a public debate over the safety of using cable crash barriers. Various tests have been carried out. These tests show a risk that modern motor-cars may pass under or between the cables of existing cable crash barriers. This has resulted in political decisions, e.g. in Denmark, to take down cable crash barriers and replace them with crash barriers having steel bars, so-called steel crash barriers. Such steel crash barriers are more expensive per running metre than corresponding cable crash barriers. However, the safety factor is essential. This is why the replacement is desirable.

It is a costly and demanding business to replace cable crash barriers with plate crash barriers. Thus, when dismounting a cable crash barrier, it is necessary to take down a cable crash barrier dimensioned to absorb the same shocks as the plate crash barriers constructed instead. In other words, one type of crash barriers is replaced by another type of crash barriers, both of which fulfil safety regulations.

Profile units for crash barriers are known in which a cover contains embedded cables. Examples of these are known from French patent publication No. 1,306,419 and German patent publication No. 1,658,664. These crash barriers cannot be used together with or for subsequent mounting on existing cable crash barriers in which the cables are supported by posts.

A cable crash barrier is known from German patent publication No. 2,918,701. In this crash barrier, piles of rubber blocks are placed at intervals instead of traditional posts. These rubber blocks are formed in the shape of tyres. The tyres are provided with tracks or recesses for receiving the cables. Also this structure involves a risk that cars may pass under or between the cables.

Consequently, there is a need for a structure that allows the use of known cable crash barriers, or the principle of known cable crash barriers, and eliminates the risk of passing through.

It is the object of the present invention to provide a solution that allows the use of cable crash barriers and at the same time involves the production of a new type of crash barriers. It is a further object of the invention to provide a such solution that is also environmentally desirable.

This object is achieved by a profile unit according to the invention being characterised in that said profile unit has a length corresponding to part of or the entire distance between two subsequent posts of the cable crash barrier and has a uniform cross-section in its longitudinal direction, and that its outer contour has a substantially vertical surface at least on the side facing a roadway.

Using the profile unit according to the invention, the spaces between the cables of the cable crash barrier are closed. It will also be possible for the profile unit to extend a distance down under the lower cables. Thus, the profile unit makes it possible to prevent the risk of passing under or between the cables of cable crash barriers. The profile unit itself does not need to possess any substantial strength since the cable crash barrier is dimensioned per se to fulfil crash barrier standards. As the cables are positioned in the recesses within the outer contour of the profile unit, there will be no risk that objects would become squeezed between the cable and the profile unit in a possible crash. Thus, the outer contour of the profile unit may have any soft cross-sectional shape known from existing plate crash barriers. Consequently, a cable crash barrier with a profile unit mounted on it will present a type of crash barrier having the same quality as a plate crash barrier but being based on the construction of the less expensive cable crash barrier.

The profile units are preferably produced from a flexible, yielding material. If this material is recycled tyres, it will be possible to solve an environmental problem. It is a growing environmental problem that ever more used tyres are being disposed of.

As a flexible, yielding material is used, it will be possible to produce the recesses for receiving the cables with an undercut cross-section having its cable reception section at the bottom of a cable introduction section of the recess. The cable introduction section merely has to be a slit. In this manner a more solid profile unit is obtained which will more safely prevent passage under the cables. As the cables are squeezed into the cable reception section, the elastic, yielding material will in a particularly safe manner retain the cable in the bottom of the recess.

If desired, other materials may also be used for producing the profile units. Thus, it will be possible to use plastic, which may be fibre-reinforced. It will also be possible to produce the profile units in a combination of several materials. Thus, it will be possible to have a central part of the profile unit covered by a thin metal plate. In such a structure,

the central part of the profile unit will be used as a support and a spacer member for metal plates facing the roadways.

In a majority of instances, cable crash barriers will be constructed with one upper cable positioned at the top of the cable crash barrier post and two lower cables positioned side by side. In certain embodiments there are two sets of lower cables side by side in two different levels. A profile unit suitable for such cable crash barriers will be provided with three recesses, namely a first recess generally positioned in an upward oriented surface and serving to receive the upper cable, and two second recesses generally positioned in a downward oriented surface and each serving to receive one or two lower cables. If a second recess serves to receive two lower cables, there will be enlarged sections in the recess corresponding to either of the two lower cables.

The lower recesses are preferably designed such that the cable reception section of the recess positioned at the bottom of the cable introduction section of the recess is displaced in outward direction toward the roadway relative to a symmetry plane of the cable introduction section of the recess. In case of a crash, the outer part of the profile unit will advantageously bend under the cable more easily and squeeze the cable introduction section together. As a consequence, both cables and profile units are retained in a particularly safe manner in relation to each other.

If the crash barrier is of the type having three cables, the profile unit will have a cross-section generally in the shape of a triangle in which the corners have been cut off. As the corners facing the roadways have been cut off, vertical surfaces are formed, which are desirable in order not to direct motor-cars over or under the crash barrier during a crash.

Owing to weight and material savings considerations, the profile unit may be produced with one or several hollows in the central part of the profile unit between the recesses.

The profile unit according to the invention may be produced by moulding or extrusion. Extrusion or moulding is possible both with regard to plastics and with regard to recycled tyres.

The profile unit may be provided in its upper side with means for fastening service devices for drivers. Thus, it will be possible to mount light reflector plates, traffic signs and the like directly on the profile unit. Therefore, the profile unit is advantageous in situations in which the crash barrier is used in a centre strip in which it is desirable to prevent the risk of blinding as cars pass each other in opposite roadways.

According to an additional embodiment, the profile unit is characterised in that it is produced in lengths corresponding to the distance between subsequent posts, including the posts of the cable crash barrier, that it has one half thickness in either end area, and that either end area has a recess corresponding to half of the cross section profile of a post and is designed to cover the post together with an opposite end area of a corresponding profile unit.

With such lengths of a profile unit it will be possible to position the half profile thickness of either end area at opposed sides of the profile unit. In this manner the cable crash barrier may be constructed such that it appears with an unbroken outer profile, both cables and posts being absorbed in recesses of the profile units. In this manner a crash barrier with a smooth and unbroken surface is obtained.

The profile units may be produced with a length only corresponding to part of the length between two subsequent posts of the cable crash barrier and, likewise, it will be possible to produce profile units having lengths that exceed the distance between subsequent posts. If the length is larger than the distance between subsequent posts, the profile unit will also be provided with a recess for receiving the post.

It will be possible to close or seal the recesses of the profile unit. This may either be done by applying strips or by filling the recesses with a plastic material. In this manner the penetration of water and the risk of corrosion are avoided. Alternatively, it will be

possible to provide the recesses with drain holes so that any penetrating water is drained off.

It is possible to produce the profile unit from two or more elements that are joined around the cables. The profile unit will preferably be produced from two halves, which may have a substantially vertical or substantially horizontal partition plane. In this type of profile unit the recesses may advantageously be directed towards another element/half. In this manner the elements/halves of the profile units are used to close or seal the recesses. Thus, water penetration and the risk of corrosion are avoided.

Cable crash barriers are known that have a number of cables positioned one over another in a generally vertical plane. In this type of cable crash barriers it will be possible to use profile units that only cover two or more of the cables positioned one over another. It only has to be ensured that the outer contour of the profile unit has a height that prevents the passage of cars between or under the cables. As mentioned, such a height will be established by international standards.

When the profile unit is composed of several elements, they may be joined around the cables by any known technique, e.g. by means of gluing, welding, screws, etc.

The invention will now be explained in detail with reference to the accompanying schematic drawings, in which

figure 1 shows a partial section view through a cable crash barrier;

figure 2 shows a first embodiment of a profile unit according to the invention;

figure 3 shows a section view through a second embodiment of a profile unit according to the invention;

figure 4 shows a section view through a third embodiment of a profile unit according to the invention;

figure 5 shows a section view through a fourth embodiment of a profile unit according to the invention;

figure 6 shows a section view through a fifth embodiment of a profile unit according to the invention;

figure 7 shows a section view through a sixth embodiment of a profile unit according to the invention;

figure 8 shows a partial view, seen from above, of a crash barrier produced with a profile unit according to the invention;

figures 9 and 10 show two examples of cover elements for cable crash barriers according to the invention; and

figures 11-13 show a section view through seventh, eighth and ninth embodiments of a profile unit according to the invention.

Identical reference numerals are used in the figures to identify corresponding or identical elements. Therefore, a specific explanation of such elements will not be given in all embodiments.

Figure 1 shows a sectional view through a cable crash barrier comprising an upper cable 1 and two lower cables 2, 3 in level with one another. The cables are supported by posts 4, which will normally be positioned at a mutual distance of about 2.5 metres. The upper cable 1 is placed in a recess 5 in the upper side of the post 4. The two lower cables are positioned in level with one another in holders 6, which are situated on either side of the post 4 and positioned in a well-defined height over roadways on either side of the cable crash barrier. The heights in which the cables 1-3 are positioned will be well defined by international standards. It should be noted that an additional set of cables may be provided in level with one another and positioned under the two shown lower cables 2, 3.

Figure 2 shows a profile unit 7 designed for use with the cable crash barrier shown in figure 1. The profile unit 7 itself may have a length that covers the entire distance between two subsequent posts, or just part of that distance. The profile unit 7 may also have a length to be shown and explained below with reference to figure 8.

The profile unit 7 is produced from a flexible, yielding material. In the embodiment shown, this material is recycled tyres. Alternatively, plastics or other rubber materials may be used. The profile unit 7 has three recesses 8, 9, 10 for receiving the cables 1-3. The profile unit 7 has substantially the shape of a triangle in which the corners have been cut off. In this manner two vertical surfaces 11, 12 are formed, which are intended to face the roadway. It will also be possible to have just one vertical surface facing a roadway. Furthermore, a substantially horizontal upward oriented surface 13 is formed at the upper side. A recess 8 is formed in the horizontal surface 13. The recess 8 has an undercut cross-section with a cable reception section 14 at the bottom of a cable introduction section 15 of the recess 8. The two lower recesses 9, 10 also comprise cable reception sections 16 at the bottoms of cable introduction sections 17 of the recesses 9, 10. It is seen that the cable reception sections 16 are displaced in outward direction toward a roadway relative to a symmetry plane 18 of the cable introduction sections 17 of the recesses. Thus, flanges 19 are formed, which will easily be bent inward during a crash due to a hinge effect in the area 20. This ensures mutual retention of the profile unit 7 and the cables 2, 3 in the recesses 9, 10. The recesses 9, 10 are formed in a downward oriented surface 37 of the profile unit 7. The profile unit is provided with a central hole 21 for material savings considerations. Such a material saving hole 21 may be used in all embodiments, even if it is not shown.

Figure 3 shows an embodiment in which the profile unit is produced with a height 22 that considerably exceeds the vertical distance 23 (see figure 1) between the upper cable 1 and the lower cables 2, 3. The profile is designed such that it extends downward past the locations of the lower cables 2, 3. In this manner, increased security is obtained that motor-cars will not pass under the cables of the cable crash barrier if only one set of lower cables is used.

The profile unit 7 of figure 4 differs from the one shown in figure 3 in that it is designed for use with a cable crash barrier having two sets of lower cables 2, 3. Thus, each of the recesses 9, 10 is provided with two cable reception sections 16.

The profile unit 7 shown in figure 5 has a different outer contour. However, also here the cables 1-3 will be received by recesses 8-10 positioned within the outer contour of the profile unit, such as will also be the case in the embodiments described above. In this embodiment longitudinal tracks 24 are shown in the upper side 13 of the profile unit. The longitudinal tracks 24 serve as means for fastening service devices, e.g. traffic signs or light reflector plates (not shown). In this embodiment the recesses 8-10 are shown as not undercut. However, it will also be possible to produce the recesses 8-10 of this embodiment with undercuts corresponding to those explained above.

Figure 6 illustrates a profile unit 7 with a different shape. Tracks 25 are formed in either side of the profile unit 7. The tracks 25 have a profile generally corresponding to the bar profile of known plate crash barriers in steel. Thus, it will be possible to fasten plate-shaped parts 26 on either side of the profile unit 7, which may be said to constitute a support element or spacer element. The plate-shaped parts 26 may be fastened by means of a bolt extending through holes 27 and a bore 28 in the profile unit 7. The plates 26 may have a considerably smaller thickness than ordinary steel plates for crash barriers, since the cables 1-3 are dimensioned to absorb the shocks of crashes.

Figure 7 differs from figure 1 in that the lower recess 10 has been modified. Thus, the recess 10 is designed with an enlarged cable reception section 16. The cable reception section 16 thus has a cross-section enabling it to receive a cable 3 and a fastening element or joint 29 placed around the cable. Alternatively, it will be possible to modify the other recesses 8 and 9 in order for them also to receive elements to be used for coupling or fastening the cables.

It will be possible to place the recesses 8, 9 parallel to each other or crossing so that they are suited to receive lower cables 2, 3 that cross each other between subsequent posts 4.

Figure 8 illustrates a cable crash barrier assembled from profile units 7 according to the invention. The profile units 7 are produced with a length 30 corresponding to the distance 31 between two subsequent posts 4 plus the lengths 32 of the posts 4. In either end area 33 the profile unit is produced with one half thickness and has a recess correspond-

ing to half of the cross-section profile of the post 4. When the profile units 7 are placed end to end, such as shown in figure 8, an end area 33 will cover the post together with the opposite end area of a subsequent profile unit 7. In this manner, an unbroken crash barrier having a smooth surface may be formed.

Two examples of cover elements 34, 35 are shown in figures 9 and 10. These are intended to be placed at the upper side 13 of a profile unit shown in figure 2-4 and 7. This will prevent the penetration of water into the recess and thus the formation of corrosion in the upper cable 1. As an alternative, the recess 8 may be filled with a plastic material, e.g. silicone or the like, in order to prevent water penetration. The cover elements 34, 35 may be fastened by gluing, welding or screws, which may be introduced through the holes 36 shown in figure 9.

Figure 11 illustrates a seventh embodiment of a profile unit 7. The profile unit is formed by two halves 37, 38, which are substantially identical around a vertical plane. The recesses 8, 9 and 10 for receiving the cables 1-3 end in a surface 39, respectively 40, of the halves 37, 38, which face each other. When the two halves 37, 38 are assembled, e.g. by means of screw connections 41, 42, a sealing occurs so that water will not penetrate and present a risk of corrosion. In the embodiment shown, the screw connections 41, 42 are also used for fastening a metal plate 43. It will be possible to place a corresponding metal plate at the other side of the profile unit. The metal plates 43 may be thin metal sheets. The strength of the crash barrier is established by means of the cables 8, 9, 10, and the profile unit 7 may be said to be a spacer member for the metal plates 43.

Figure 12 shows an eighth embodiment of the profile unit 7 according to the invention. This profile unit is also produced by two elements 37, 38. In this embodiment, the elements are joined around a substantially horizontal plane. Also in this embodiment the recesses 8, 9 and 10 end in the surfaces 39, 40, which face each other. This embodiment may also be provided with a metal plate 43 if desired.

Figure 13 shows a ninth embodiment of the profile unit 7 according to the invention. This profile unit 7 is provided with recesses 8, 9 for receiving two cables placed one

over another. In this embodiment, four cables 1 are placed one over another in a substantially horizontal plane. In such a crash barrier it will suffice that the profile unit just covers two or three of the cables 1. Also in this embodiment, the profile unit 7 may optionally be provided with a metal plate 43, such as shown in figure 11.

Various embodiments of profile units are shown in the figures of the drawings. However, it will be possible to modify the profile unit of the invention. Thus, the profile unit may have other cross-section shapes than those shown. It will thus be possible to produce the profile unit with a substantially rectangular shape or with a corrugated surface facing a roadway next to the cable crash barrier.

CLAIMS

1. A profile unit for cable crash barriers consisting of cables supported by posts, which are arranged at intervals in the length of the cables and have recesses for receiving the cables, said profile unit comprising recesses for introducing and receiving the cables of the cable crash barrier within the outer contour of the profile unit, characterised in that said profile unit has a length corresponding to part of or the entire distance between two subsequent posts of the cable crash barrier and has a uniform cross-section in its longitudinal direction, and that its outer contour has a substantially vertical surface at least on the side facing a roadway.

2. A profile unit according to claim 1, characterised in being composed of two elements that are joined around the cables.

3. A profile unit according to claim 1 or 2, characterised in that it is provided with three recesses for receiving one upper cable and lower cables arranged side by side, and that it has a first recess in an upward oriented surface and two second recesses in a downward oriented surface.

4. A profile unit according to any one of claims 1 to 3, characterised in that said cross-section has substantially the shape of a triangle with cut-off corners.

5. A profile unit according to claim 3 or 4, characterised in that at least the second downward oriented recesses have an undercut cross-section with a cable reception section at the bottom of a cable introduction section of the recess.

6. A profile unit according to claim 5, characterised in that the cable reception section of the recess is displaced in outward direction toward the roadway relative to a symmetry plane of the cable introduction section of the recess.

7. A profile unit according to any one of claims 3, 5 and 6, characterised in having a height that substantially exceeds the vertical direction between the upper cable and the lower cables, and in extending downward beyond the lower cables.

8. A profile unit according to claim 2, characterised in that it is provided with two or more recesses for receiving a number of cables arranged one over another in a substantially vertical plane.

9. A profile unit according to any one of the preceding claims, characterised in that it is produced in lengths corresponding to the distance between two subsequent posts. including the posts of the cable crash barrier. that it has one half thickness in either end area. and that either end area has a recess corresponding to half of the cross section profile of a post and is designed to cover the post together with an opposite end area of a corresponding profile unit.

10. A profile unit according to any one of the preceding claims. characterised in that it is produced from a flexible, yielding material. preferably recycled tyres.

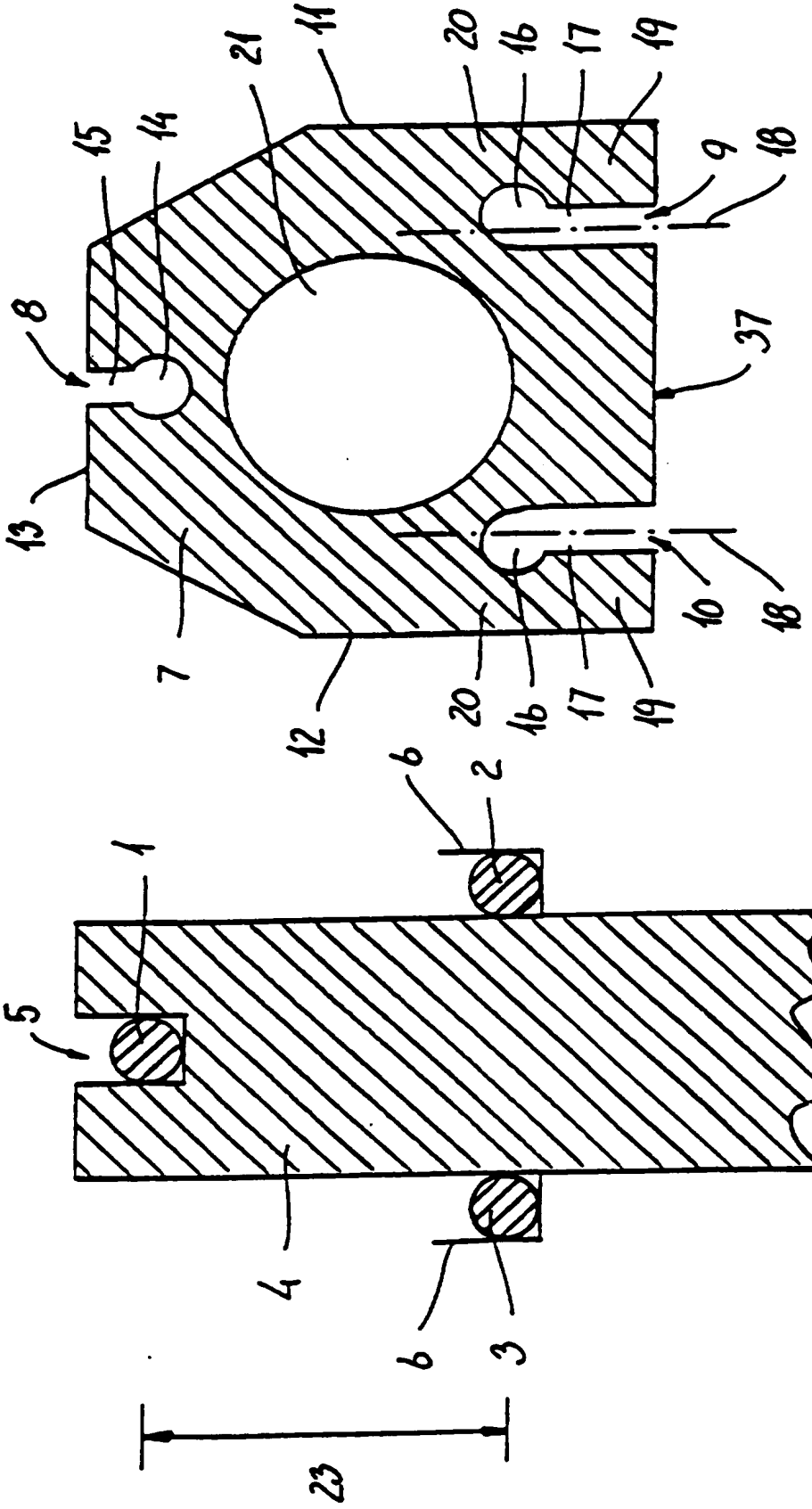


Fig.2

Fig.1

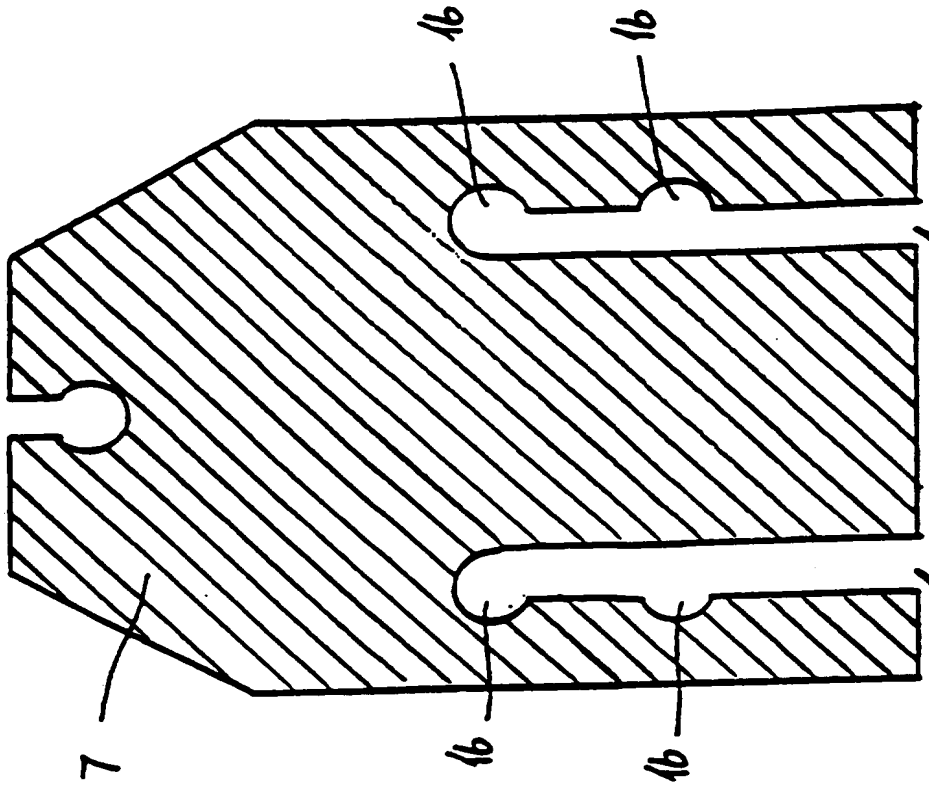


Fig.4

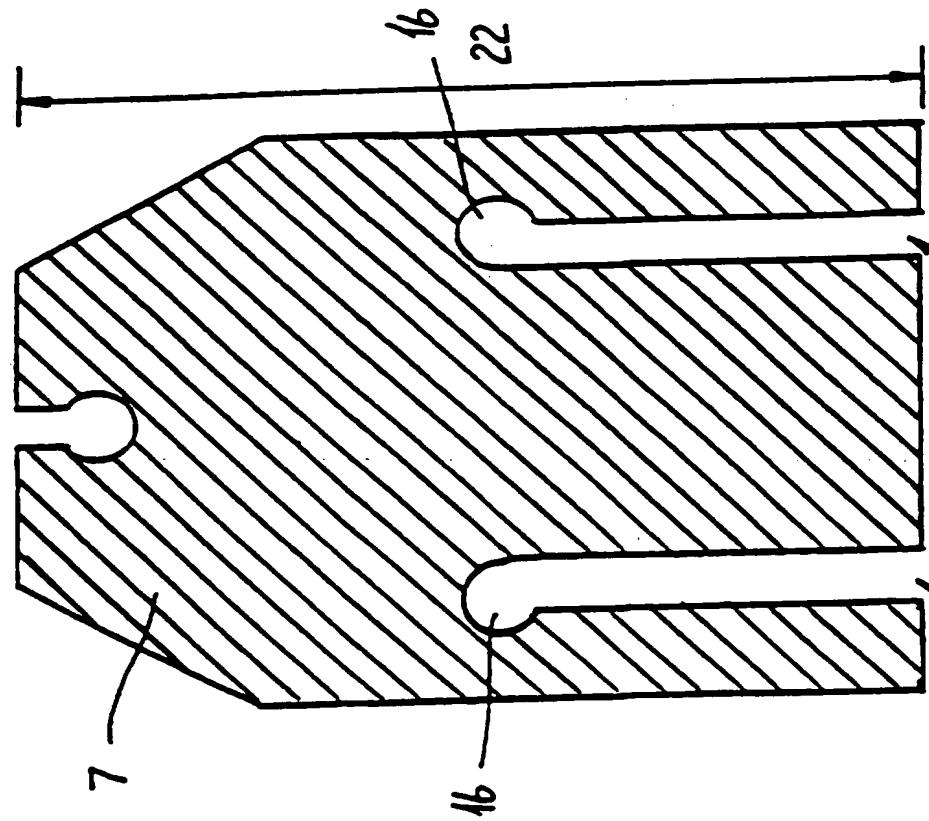


Fig.3

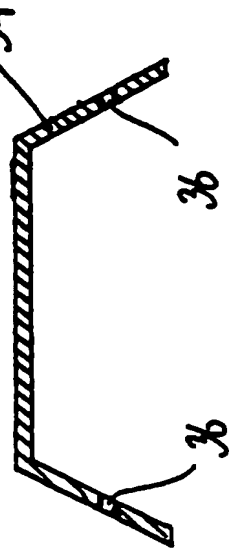


Fig. 9

Fig. 10

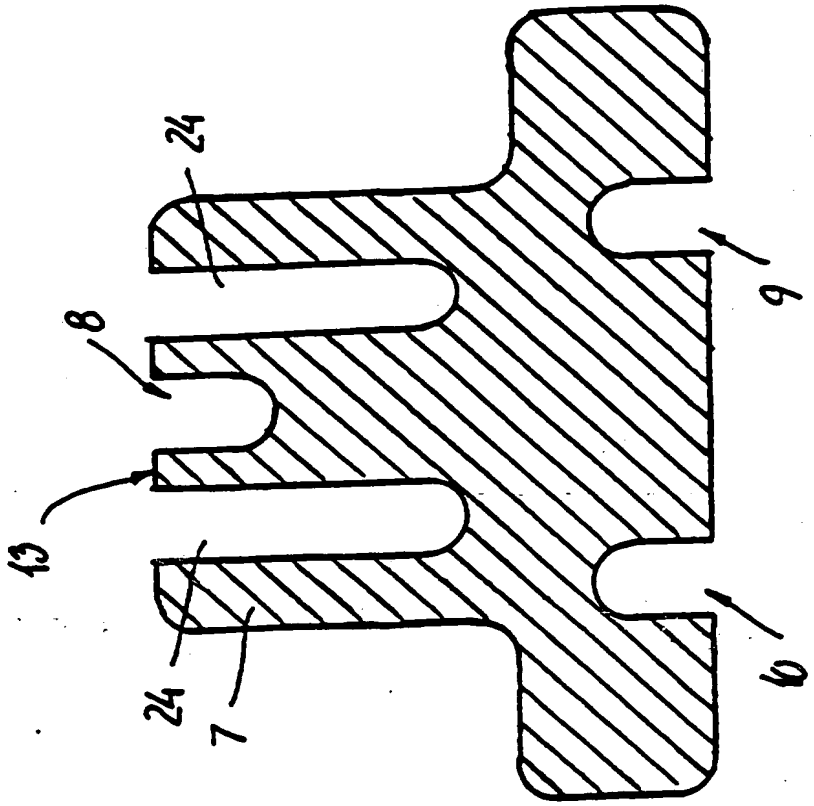


Fig.5

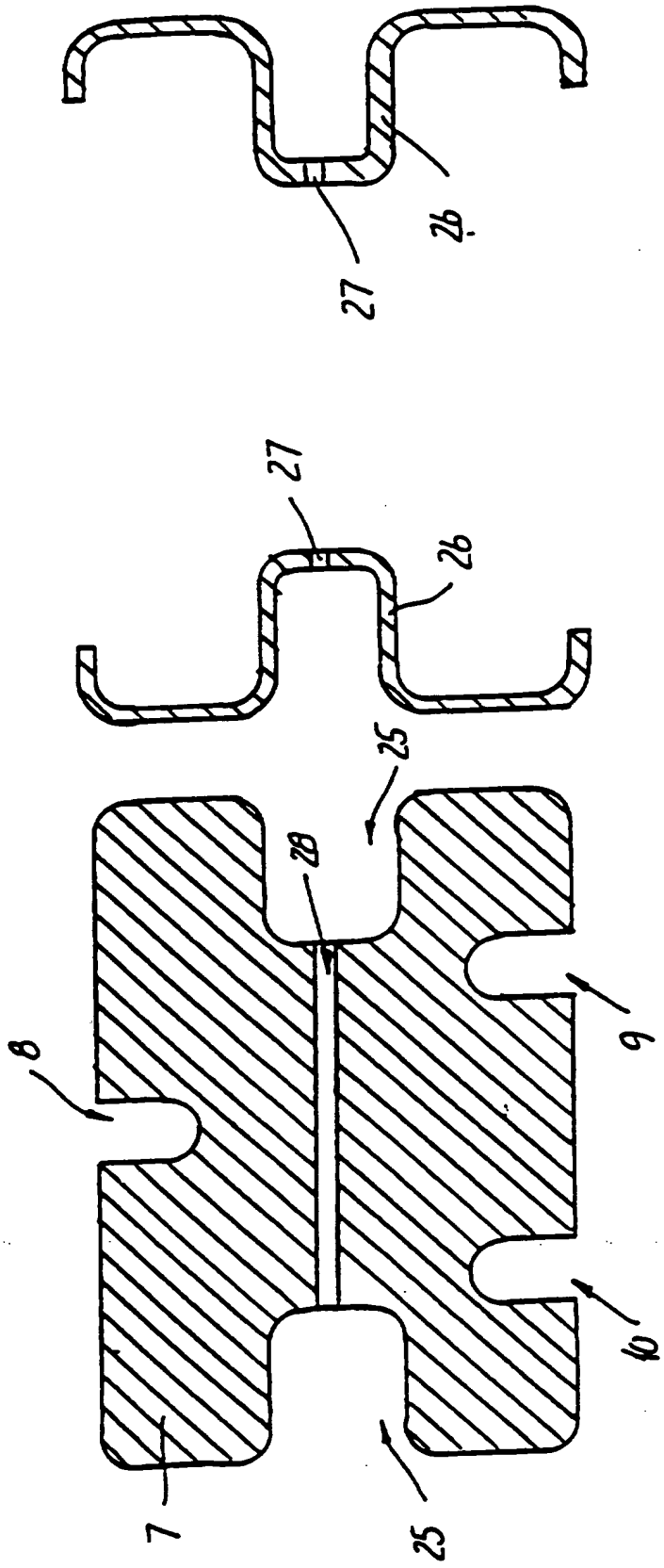


Fig. 6

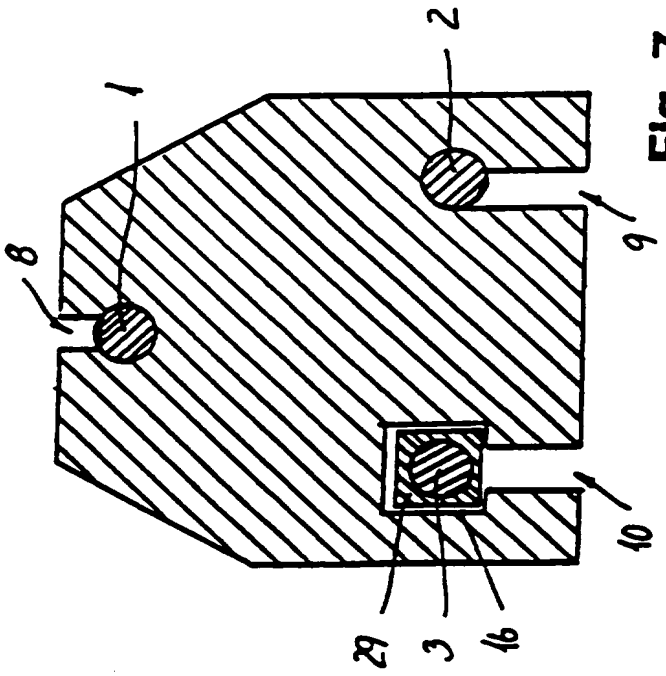


Fig. 7

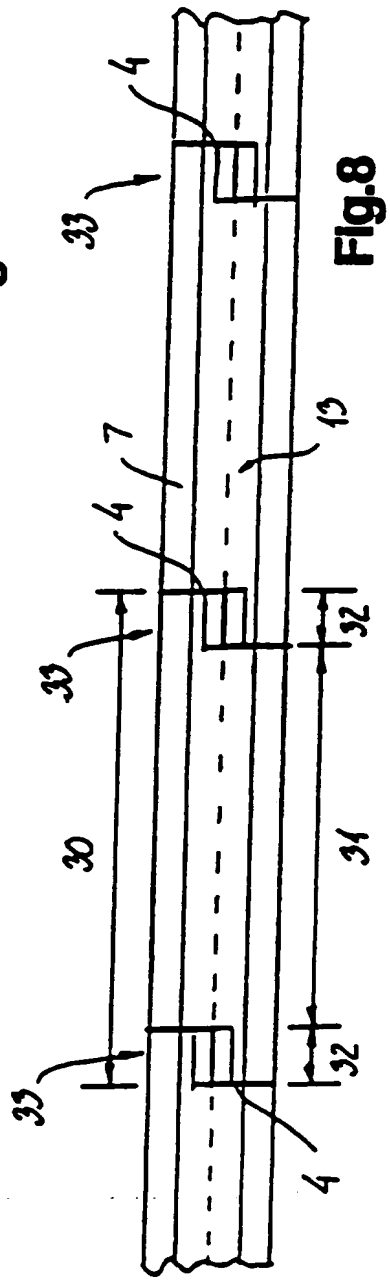


Fig.8

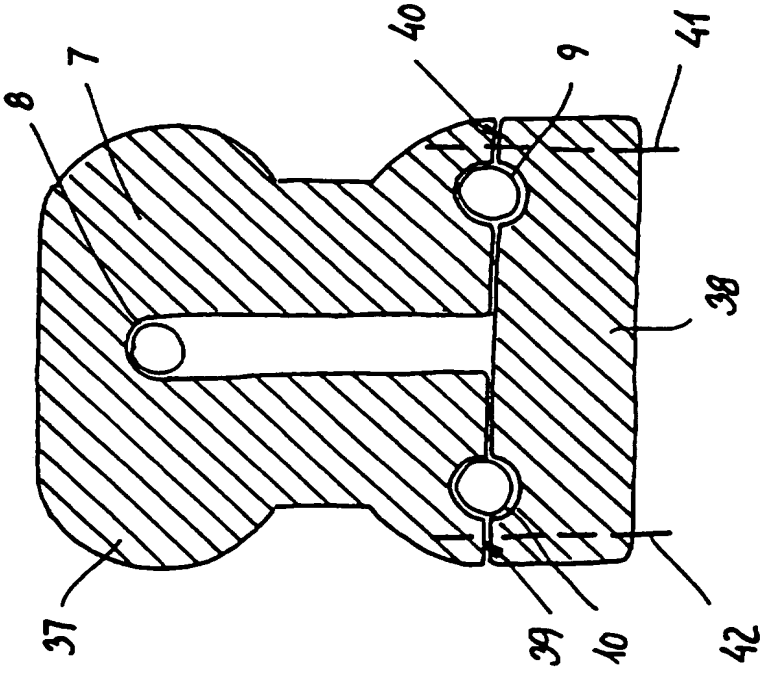


FIG. 12

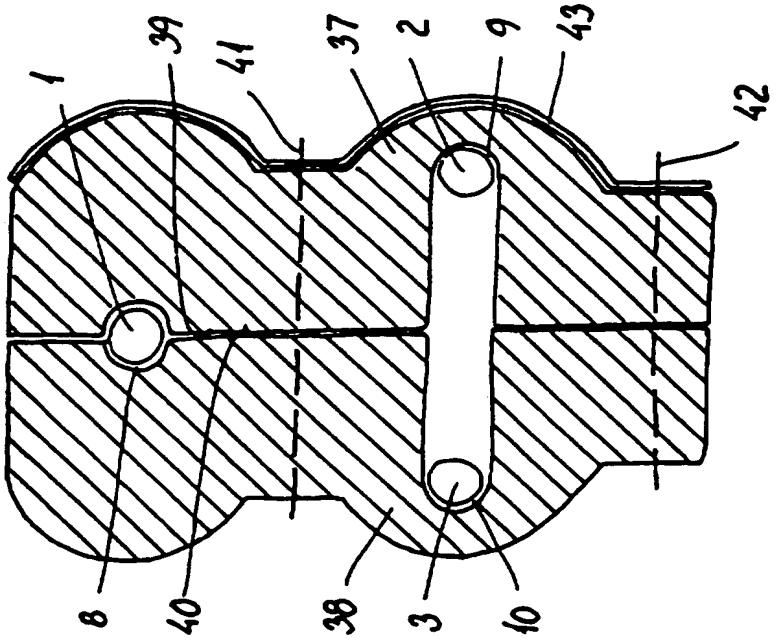


FIG. 11

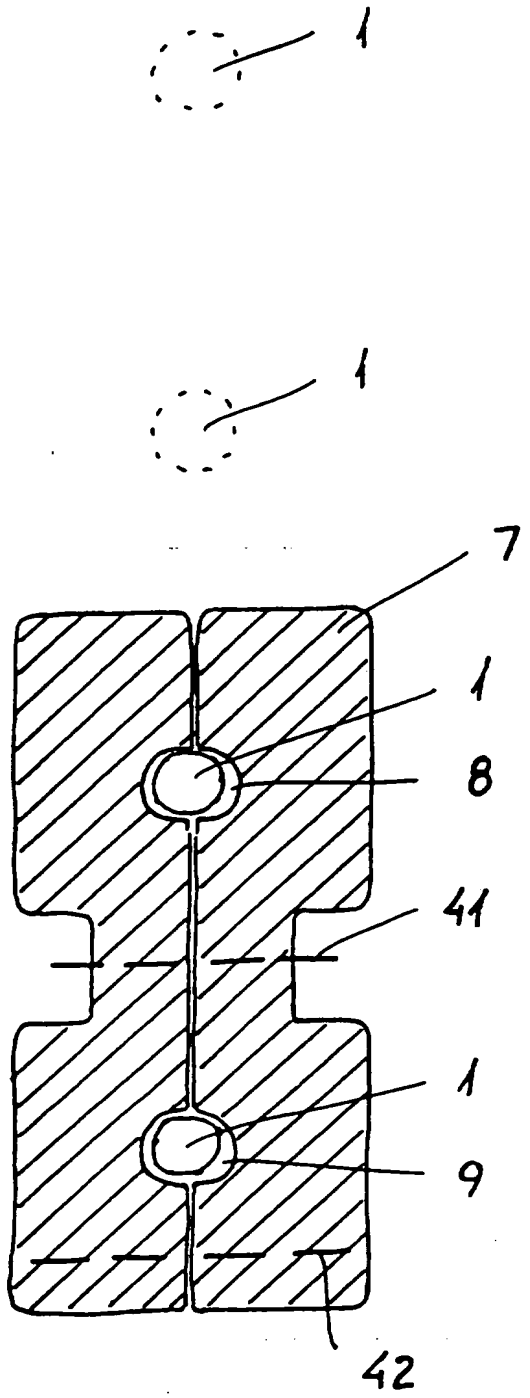


FIG. 13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 96/00110

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: E01F 15/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: E01F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 1658664 A (GUBELA, G.), 10 December 1970 (10.12.70) --	1-10
A	DE 2918701 B2 (MOREAU, J.P.), 4 Sept 1980 (04.09.80) --	1-10
A	GB 2224528 A (BRITISH ROPES LIMITED), 9 May 1990 (09.05.90) --	1-10
A	GB 2224529 A (BRITISH ROPES LIMITED), 9 May 1990 (09.05.90) --	1-10

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 June 1996	05 -07- 1996
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Åke Olofsson Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 96/00110

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9509278 A2 (PAPP, J.), 6 April 1995 (06.04.95)	1-10
	--	
A	US 5429449 A (G.A. BAATZ), 4 July 1995 (04.07.95)	1-10
	--	
A	FR 1306419 A (E. MICHEL), 3 Sept 1962 (03.09.62)	1-10
	--	

INTERNATIONAL SEARCH REPORT

Information on patent family members

01/04/96

International application No.
PCT/DK 96/00110

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A- 1658664	10/12/70	NONE	
DE-B2- 2918701	04/09/80	BE-A,A- 876095	03/09/79
		CA-A- 1142007	01/03/83
		CH-A- 631222	30/07/82
		FR-A,A,B 2425503	07/12/79
		GB-A,B- 2030198	02/04/80
		US-A- 4288061	08/09/81
GB-A- 2224528	09/05/90	AT-T- 117391	15/02/95
		AU-B,B- 623193	07/05/92
		AU-A- 4450689	17/05/90
		CA-A- 2002442	08/05/90
		DE-D,T- 68920706	14/06/95
		DK-B- 169214	12/09/94
		EP-A,A,B 0369659	23/05/90
		SE-T3- 0369659	
		ES-T- 2066861	16/03/95
		FI-B,C- 91905	13/05/94
		JP-A- 2171406	03/07/90
		PT-B- 92221	12/09/95
		RU-C- 2003758	30/11/93
		US-A- 5039066	13/08/91
GB-A- 2224529	09/05/90	NONE	
WO-A2- 9509278	06/04/95	NONE	
US-A- 5429449	04/07/95	EP-A,A- 0683272	22/11/95
		IL-D- 113620	00/00/00
FR-A- 1306419	03/09/62	NONE	